**INDIAN MARITIME UNIVERSITY**
(A Central University, Government of India)

**May/June 2016 End Semester Examinations**
**B.Tech. (Marine Engineering)**

**Fifth Semester – Naval Architecture – I (UG11T1506/UG11T2506)**

**Date : 29.06.2016** **Max. Marks: 100**
**Time: 3 Hrs** **Pass Marks : 50**

**Part-A** **(3 x 10 = 30 Marks)**
**Compulsory Question**

1) a) What Is Angle of Loll?
b) Define the term "Permeability".
c) What is centre of floatation (LCF)?
d) What is the importance of Admiralty Coefficient?
e) Define TPC and explain why TPC varies with different draughts
f) Define DWT of a Vessel.
g) State the Simpson's first rule
h) Define buoyancy and reserve buoyancy
i) What do you understand by transverse metacentre and metacentric height
j) What is curve of statical stability? Explain.

**Part-B** **(14 x 5 =70 Marks)**
**Answer any Five Questions**

2) A 6m model of a ship has a wetted surface area of 8m2.When towed at a speed of 3knots in fresh water, the total resistance is found to be 38N.
If the ship is 130m long, calculate the effective power at the corresponding speed. Take n=1.825 and calculate 'f' from the formula .SCF 1.15. (14)

3) In an inclining experiment, a mass of 12.5 tonnes was moved 10 metres across the deck and caused a plumb line, 12 metres long to move out 320 mm. A double bottom tank in the ship was full of water, during the experiment. Mass of water in the tank is 450 tonnes and had its centre of gravity 0.9 metres above the keel, without which the ship would have been in the light condition. If the ship's displacement at the time of experiment was 3750 tonnes and her KM was 9.0 metres, find:
a) The KG at the time of experiment. (9)
b) The light KG (5)

4) A ship 100 m long arrives in port with draughts of 3m at FP and 4.3 m at AP. The hydrostatic particulars are TPC=10, MCTC= 120 tm, LCF= 3m aft of amidships. 80 tonnes of cargo is now loaded at a position of 24 m ford. of amidships and 40 tonnes of cargo is discharged from 12m aft of amidships. Find out the new draughts. (14)

5) The ½ ordinates of a waterplane 120 m long are as follows :

| Section | AP | 0.5 | 1 | 1.5 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 8.5 | 9 | 9.5 | FP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ½ ord | 1.2 | 3.5 | 5.3 | 6.8 | 8.0 | 8.3 | 8.5 | 8.5 | 8.5 | 8.4 | 8.2 | 7.9 | 6.2 | 3.5 | 0 m |

Calculate (i) waterplane area
(ii) Distance of centroid from midship.
(iii) Second moment of area of waterplane about centroid. (14)

6) (a) Define Centre of gravity of a ship. (02)

(b) A ship of 4000 tonne displacement has its centre of gravity 1.5 m aft of midships and 4 m above keel. 200 tonne of cargo are now added 45 m forward of midships and 12 m above the keel. Calculate the new position of the centre of gravity and the angle in which the centre of gravity moves relative to the horizontal. (12)

7) Why the inclining experiment is conducted? Briefly explain the procedures to carry out in details. (14)

8) (a) Define free surface effect (02)

(b) A ship of 8000 tonne displacement has its centre of gravity 4.5 m above the keel and transverse metacentre 5 m above the keel when a rectangular tank 7.5 m long and 15 m wide contains sea water. A mass of 10 tonne is moved 12 m across the deck. Calculate the angle of heel if

(i) there is no free surface of water

(ii) the water does not completely fill the tank (12)

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